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(54) Title: CLOSED CIRCUIT TELEVISION SYSTEM

(57) Abstract

There is disclosed a CCTV system comprising a plurality of control network nodes in which the occurrence of events is broadcast over the network and each node responds thereto in a predetermined manner.

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CLOSED CIRCUIT TELEVISION SYSTEM

This invention relates to the field of surveillance systems, in particular Closed Circuit Television (CCTV) systems.

Surveillance systems in which multiple cameras are crosspoint switched to multiple monitors are well known. Other well known prior art systems include movable camera "pan, tilt & zoom" (PTZ) heads. Figure 1 depicts a typical arrangement which comprises a matrix switch 10, a plurality of cameras 12a-f, a plurality of keyboards 14a,b, several monitors 16a-d, and a "multiplexer" 18 to encode video onto a video cassette recorder (VCR) 20. The cameras may be fixed (12a) or movable (12b-f). Systems of this type usually incorporate alarm input triggers 22 and alarm output controls 24. The former may be connected to devices such as intruder alarm sensors and door pushes, whilst the latter may be employed to perform such functions as driving sounding devices and opening electrical locks.

The PTZ heads are usually driven by AC or DC "telemetry receivers". The AC version is the more straightforward since it is relay driven and fixed speed, whilst the DC version uses proportional current control of a DC motor to achieve high speeds and variable speed operation.

A typical system employs some form of "control network" to permit a central microprocessor (usually within the matix switch) to sequence the operation of the system. Systems of this type find application in, for example, large retail stores, shopping centres, town centre monitoring schemes and industrial site monitoring. Such

applications necessitate complex wiring and the installation of cameras over very wide areas.

The present invention provides a new approach to the structure of a surveillance system and enhancements to various aspects thereof, resulting in improvements in performance and flexibility

According to one aspect of the invention there is provided a CCTV system comprising a plurality of control network nodes in which the occurrence of events is broadcast over the network and each node responds thereto in a predetermined manner.

Such a system does not necessarily require the intervention of a central events processor.

A node may be a telemetry receiver, matrix switch, VCR, multiplexer, alarm input or output module, keyboard or video transmitter.

The nodes may be reprogrammable and, additionally, the characteristics of peripherals such as VCRs and multiplexers may be downloaded.

The network may comprise a modem.

The system may comprise a video transmission system, and this transmission may be via standard analogue and digital telephone connections, radio, a packet switched data network , a dedicated data network, a leased line or a similar method.

The network may be linked by RS485 or RS422 connections, Free Topology wiring, fibre optic data, microwave, line of sight optical or radio links, or combinations thereof.

The network may support several telemetry protocols.

Telemetry and control data may be sent to or received from receivers over the same coaxial cable that transmits the returning video signal.

The telemetry receivers may be separate from the cameras, part of the cameras or within the camera housing.

The control network may be the "Echelon" system.

The matrix switches may be cascaded.

The system may be capable of redundant event handling and may comprise a centralised computing hub.

The system may comprise an audio switching system.

The system may comprise a PC system configuration tool which may be employed at a central monitoring site.

According to another aspect of the invention there is provided a method of reprogramming nodes comprising the steps of:

providing a node with a microprocessor having a volatile and a non-volatile memory area;

partitioning the non-volatile memory area into two segments;

programming one segment of the non-volatile memory with standard executable code;

transmitting reprogrammed code to the volatile memory;

validating the reprogrammed code;

copying the reprogrammed code into the other segment of the non-volatile memory; and

resetting the microprocessor to run the reprogrammed code.

In the event of an error or a special command the reprogrammed code in the other segment of the non-volatile memory may be cleared and the standard executable code used.

The validation may be performed using standard checksums, parity bits and error correcting codes. The non-volatile memory area may be a FLASH ROM, EEPROM or battery backed RAM, and the volatile memory area may be RAM.

According to yet another aspect of the present invention there is provided a telemetry receiver which is remotely programmable for gain and lift.

According to another aspect of the present invention there is provided a telemetry receiver which transmits some or all of the pan, tilt and zoom settings. This

information may be utilised to obscure a desired feature in the field of view of a camera, and to enable remote control of the apparent pan and tilt speed.

According to another aspect of the present invention there is provided a telemetry receiver which can be downloaded with the characteristics of a desired PTZ head.

According to another aspect of the invention there is provided an operator's keyboard for a surveillance system having a card reader facility to identify the operator and the operator's level of access to the system. The surveillance system may be a CCTV network of the type mentioned above.

The card may be a magnetic card or a Smart Card.

The operator's keyboard may additionally have a PIN number access.

The card may be programmed to identify the operator's training status which may be used to control the operator's access to the system.

The card may be programmed to identify an operator's priority level.

According to another aspect of the invention there is provided a CCTV system for low light level applications comprising a CCTV camera and a frame store, in which the camera accumulates light for an extended exposure time during periods of low light level, the extended exposure time being greater than the period of one field, and the

frame store repeats the previous frame during the extended exposure time, characterised in that :

the frame store is situated in the monitoring end of the system.

The frame store may be contained within a matrix switch.

The CCTV camera may automatically switch between ordinary operation and low light level operation.

The CCTV camera may transmit fields with blanked video throughout the field during the extended exposure time and the presence of a blanked video field may be identified by the use of coding. The coding may be Teletext compatible.

According to a final aspect of the invention there is provided an overhead track system for adjustably positioning at least one CCTV camera, the track system comprising :

a rail having at least two tracks supplying power for the at least one camera;

video transmitting means; and

at least one mount, insertably mountable in said rail, connectable to a camera and having connectors to convey power to the camera.

The camera may be fixed or mounted on a PTZ head.

The video transmitting means may comprise a video track and at least one video return track.

The rail may comprise two video return tracks and two AC power tracks, allowing reversible positioning of the mount.

Alternatively, the rail may comprise two video return tracks and four DC power tracks, also allowing reversible positioning of the mount.

The rail may comprise separately wired zones into which no more than one camera may be positioned.

The video transmitting means may comprise low power radio or infra red links.

The video transmitting means may comprise an inductive loop connection.

Embodiments of CCTV systems and components thereof will be now be described with reference to the accompanying drawings, in which :

Figure 1 is a schematic diagram of a prior art network;

Figure 2 is a schematic diagram of a network of the present invention;

Figure 3 is a schematic diagram of the memory management scheme;

Figure 4 is a schematic diagram of a remotely accessed system;

Figure 5 shows an area to be obscured;

Figure 6 is a schematic diagram showing camera arrangements;

Figure 7 shows blanked video signals; and

Figure 8 shows various views of the track system.

Figure 2 depicts an embodiment of a CCTV system of the present invention comprising a plurality of control network nodes in which the occurrence of events is broadcast over the network and each node responds thereto in a predetermined manner.

Such a system does not necessarily require the intervention of a central events processor.

The system of Figure 2 comprises a plurality of CCTV cameras 26a-j, which may be fixed (26a,26g) or movable on PTZ heads (26b-f, 26h-j). The latter require dedicated telemetry receivers 28b-f, 28h-j. The network further comprises matrix switches 30,32 a VCR 36 and multiplexer 38, an alarm input module 40 and an alarm output module 42. The system is controlled via operating stations 44,46, which themselves comprise keyboards 44a,46a and monitors 44b,c, 46b,c, and a setup station

48. In the context of Figure 2, the network nodes are the receivers 28b-f, 28h-j, the matrix switches 30,32 the VCR 36, the multiplexer 38, the alarm input module 40, the alarm output module 42, the keyboards 44a, 46a and the setup station 48.

Prior art systems generally employ a single central processor which waits for an "action" request and, upon receiving such a request, commands other parts of the system to act. For example, when an alarm occurs, the central processor issues a stream of actions over the control network which instruct "slave" nodes to perform certain actions. Examples of such actions would include a camera panning to a preset position, switching certain cameras to particular monitors and starting a video recording.

The system of the present invention represents a radical departure from traditional matrix systems, supporting a much wider sphere of operation and permitting matrices to be cascaded with distributed intelligence. The advantages are gained through the decoupling of "events" and "actions", whereby an event, such as an alarm occurrence, is broadcast on the network and each node responds in a predetermined fashion to this broadcast. The result is a more rapid, flexible and expandable structure.

An additional advantage accruing from the present system is that all nodes may be reprogrammable, permitting software to be upgraded without the need to visit each node. The reprogrammability is achieved by a novel system of memory management which is illustrated in Figure 3. The node microprocessor has a non-volatile memory area 48, which may be, for example, FLASH ROM, EEPROM or battery backed RAM, and a volatile memory area 50, for example RAM. The non-volatile memory 48 is partitioned into two segments 48a,b. The first segment 48a is programmed in the

factory with standard executable code which may be transferred into the (usually faster access) volatile memory 50 for execution.

When data is received over the network to reprogram the code or the data structures, it is received into volatile memory 50 and validated for accuracy by the use of standard checksums, parity bits and error correcting codes. Once validated, the data is copied into the correct portion of the second segment 48b of the non-volatile memory area. The incoming data may be split into several "blocks" to ease transmission and re-transmission; in this instance each block would be independently verified in the volatile memory 50 before transfer to the second segment 48b of the non-volatile memory area either individually or as a complete set. At the end of the download process the microprocessor resets itself to run the new code. On power up or on a reset operation, the code in the volatile memory 50 checks whether valid code is stored in the second segment of 48b the non-volatile memory. If this is the case, the volatile memory 50 links with it for execution, bypassing the remaining code in the first segment 48a of the non-volatile memory.

In the event of an error, or as a special command, the second segment 48b of volatile memory area may be cleared, enabling a return to the standard executable code.

A variation on the above described approach is to provide an external non-volatile switch which determines whether the processor runs code from the first 48a or second 48b segment in the non-volatile memory.

An additional advantage with the reprogrammable node system is that the characteristics of VCRs, multiplexers and other peripherals may be downloaded.

It should be noted that this method of reprogramming nodes is not limited to CCTV systems of the present invention, but rather may be applied to a wide range of surveillance systems.

The network may comprise a modem, in which instance functions such as the running of diagnostics, system setup, system configuration and updating of software may be performed from a remote site.

Alternatively, the system may comprise a video transmission system, which allows a site to be monitored remotely using, for instance, standard analogue and digital telephone connections. Such a transmission system may also be used for telemetry control in addition to the software based functions described above in relation to the use of a modem. The ability to update software and system setup and configuration from one site is of benefit to installers who can concentrate skilled system designers in central locations.

Figure 4 illustrates an example system having a plurality of CCTV cameras 52a-j, dedicated telemetry receivers 54a-g, matrix switches 56,58,60, an alarm input module 62, an alarm output module 64. The system is controlled via operating stations 66,68,70,72 which themselves comprise keyboards 66a,68a,70a,72a and monitors 66b,68b,70b,c,72b. Operating station 72 is a central monitoring/support station positioned at a different location to the remainder of the above described components.

The off-site capability is provided by video transmitter 74 and video transmission receiver 76, characterised by the video transmitter 74 being connected to both the video and the network within the CCTV system.

The transmission may also be via radio, a packet switched data network , dedicated data networks or leased lines such as Kilostream and Megastream.

The network may be linked by various means including standard structured wiring such as RS485 or RS422 connections, Free Topology wiring (non-structured wiring) and fibre optic data, microwave, line of sight optical or radio links or combinations thereof. A fibre optic link is depicted in Figure 4 (78) providing video and control network linkage, although often such a link will be used soley for control purposes. Each network module may advantageously have an interchangeable sub-module to connect to the control network.

The control network can support different telemetry protocols through protocol converters.

The fixed and variable speed receivers may receive telemetry data over the same coaxial cable that transmits the returning video signal.

The receivers may be separate from the cameras, part of the cameras or within the camera housing.

The current implementation of the network employs the recognised international standard "Echelon" as the control network, which permits connection to other facilities such as building management and fire alarm system.

The matrix switch modules may be cascaded - as shown in Figures 2 and 4. This has the benefit of acting as wiring concentrators and permits CCTV systems to be connected together as they are expanded. The structure is reconfigurable and hierarchical.

In a very large system redundant event handling may be included; a centralised computing hub may be incorporated in order to handle more complex events and actions.

The system may comprise an audio switching system which routes audio signals to and from the operator positions under the control of the data network. Other extensions to the network might include integration of the network interface/telemetry receivers into the cameras and alarm sensors themselves. In the case of cameras such an arrangement would be beneficial since it wold replace the usual configuration switches, allowing the cameras to be set up from the control room.

A great deal of the system is configurable and therefore a PC support tool is advantageously employed for setting up and installation at one level and easing the specification of the system at another level.

For installation purposes the PC support tool allows :

definition of the system, such as numbers and types of equipment, camera names, alarm names, locations;

definition of the conditions that cause "events" to be registered;

definition of the "actions" each node takes in response to an event; and

compilation and sorting of this information and transmission of the relevant setup information to each node via the control network.

Possible extensions of this tool include inter alia the use of neural networks and the addition of other support tools such as diagnostics, test routines, performance monitoring, alarm logging and access logging.

The tool may be employed at a central monitoring site.

Another aspect of the invention is the provision of telemetry receivers which are remotely programmable for video signal gain and lift. This new function permits the gain and lift parameters of the video buffer to be changed centrally from an operator's keyboard, rather than adjusting manually at the camera/receiver site. The benefits are that less time is spent on installation and errors are easily correctable. The effect of "gain and lift" is to compensate for the losses found on longer video cable runs.

The invention also provides telemetry receivers which transmit some or all of the pan, tilt and zoom settings. This allows adaptive operation of the on screen titles, for example, changing the titles to display different street names depending on the

position of a camera observing a junction. There are two further applications of such a receiver:

(a) Privacy function. This function further exploits the ability to transmit pan, tilt and zoom settings. The privacy function prevents an operator observing particular sensitive areas such as private houses, bedroom windows. In the case of a fixed camera this is accomplished in straightforward manner by electronically blanking out or distorting the relevant portion of the picture. Such an operation becomes more difficult when the camera is moveable, and/or has a zoom lens, since the area to be obscured varies. The problem is overcome in the present invention by using the pan, tilt and zoom settings to accurately and dynamically calculate the position of the sensitive area in the current image. Figures 5a-c illustrate the method employed by reference to a house 80 having a window 82 to be obscured. Figures 5a and 5b show the window 82 on the monitor 84 at full zoom in and full zoom out, respectively. The area to be obscured is calculated using trigonometry from the pan, tilt and zoom settings. In Figure 5c, the geometry along the pan (horizontal) axis is considered; if α is the pan angle between the camera viewing axis 85 and the reference axis 86 (defined as the axis containing the reference point 88 and the position of the camera lens 87), δ is the angular field of view from the lens at the current zoom setting, and α_1, and α_2 are the pan angles to, respectively, the left and right hand sides of the area to obscure :

$$A/C = \tan(\alpha-\alpha_2)/\tan(\delta/2) \quad (1)$$

$$B/C = \tan(\alpha-\alpha_1)/\tan(\delta/2) \quad (2)$$

$$\delta = f(\text{zoom setting}) \quad (3)$$

Thus from a knowledge of the ratios of equations (1) and (2) it is possible to calculate the pixels involved in obscuring the window 82 along the horizontal axis. A similar methodology is adopted for the tilt angle.

The angles α_1 and α_2 and the corresponding tilt reference angles can be pre-programmed, or more advantageously, "learnt" at the installation time. Similar comments apply to the relationship between δ and the zoom setting.

Although the method is described with reference to rectangular shapes it may be extended easily to polygons. Alternatively, multiple rectangular shapes may be used to build up a representation of an irregularly shaped area which is to be obscured.

(b) Remote control of the apparent pan and tilt speed. Systems allowing remote control of camera pan and tilt speeds are known using, for instance, a joystick as the controlling device. The speed of the pan and tilt is normally linked directly to the position or movement of the controlling device, giving an actual pan/tilt speed. However, the apparent pan/tilt speed also depends on the focal length of the lens, which varies on cameras equipped with zoom lenses. The person controlling the camera would normally have to compensate for this dependency on the focal length.

The present invention enables the operator to control the apparent pan/tilt speed by using feedback of the focal length of a zoom lens. The signal from a telemetry receiver representing the current focal length is fed back into a controlling circuit which also receives signals showing the position or movement of the controlling device. The controlling circuit uses a function of all of these signals to generate the control signals

for the pan and tilt speeds thereby providing user control of the apparent pan and tilt speeds.

Receivers of the present invention may be downloaded with the characteristics of a particular variable speed PTZ head. Such a function is useful because most variable speed heads have different operation requirements (e.g. PWM frequency, current drive). Traditionally, different telemetry receivers have had to be produced for each type of variable speed head.

Another aspect of the invention is an operator's keyboard for a surveillance system having a card reader facility to identify the operator and the operator's level of access to the system. The surveillance system may be a CCTV system of the present invention.

The card may be a magnetic card or a "Smart Card".

The operator's keyboard may additionally have a PIN number access facility, which is used as a secondary verification in the event of lost cards.

The card may be programmed to identify the operator's training status, which may be used to control the operator's access to the system. Different access and training levels can be assigned depending on the type of user concerned. Examples of different types of user are :

basic operator - limited to specific actions and cameras;

supervisor - permitted greater freedom - possibly access to additional cameras and the ability to control video recording;

installer - allowed to program "intelligent" features and run diagnostics; and

manufacturer - allowed to fully diagnose problems and change software.

Different levels may also be used to partition access to the system. For instance, the gate security guard may only be permitted to monitor the car park and roads, the receptionist may only monitor the front door and the corridors, whilst the site manager has access to all cameras.

The levels of access, zones of access and priority level of the user are programmed on the card. The priority level is used to arbitrate between different keyboards attempting to access the same camera simultaneously. Thus an operator will be able to control a camera which is being used by a person having a lower priority; control is released automatically when a predetermined period of time has elapsed since the last command sent to the camera.

The system may also incorporate a means for "blacklisting" certain cards, such as those possessed by ex-employees.

Cameras are generally limited to a longest exposure time of 1/50 second (CCIR/PAL systems) or 1/60 second (EIA/NTSC systems) since these times correspond to the period of one field, and picture is conventionally retransmitted on every field. Figure 6a shows, in schematic form, a conventional arrangement consisting of a camera

90 having sensor and video processing means 92 and a video output buffer 94, and a monitor 96 for displaying the video after passage through, for example, a CCTV network. Cameras are known that extend the exposure time by incorporating a frame store 98, as shown in Figure 6b, When the light level is low, frames are repeated on the video output from the frame store whilst light is accumulated for a period greater than that of one field. The effect is to provide low light operation at the expense of picture update rate, which in many instances is an acceptable compromise. However, the provision of a frame store in each camera is a considerable expense. The present invention provides a less expensive means of achieving low light operation by locating the frame store in the monitoring end, thereby reducing the number of frame stores required from one per camera to one per monitor. Figure 6c shows such an arrangement, having a video switch 100 to switch between cameras and control units 102,104 situated in the camera and the monitoring ends, respectively.

The monitoring end may comprise part of the CCTV network of the present invention. Advantageously, the frame store may be contained within a matrix switch.

The camera may automatically switch between ordinary operation and low light level operation.

To implement the method it is necessary to change the definition of the video signal transmitted from the camera. In normal operation the camera continuously transmits a standard odd/even field picture. This is shown in Figure7a; the signal comprises a number of fields 102-a-f, each field comprising video signal 104 and various synchronisation pulses 106. As shown in Figure 7b, when accumulating light for longer

than one field, some fields 108c,d are left blank by omitting video signal. It should be noted, however, that the line and field synchronisation pulses remain. The frame store detects incoming data with no video content and repeats the previous frame to the monitor. It is possible to identify the presence of a blanked video field by the use of coding in the line or field blanking. The coding may be in the form of "Teletext" compatible signals.

A consideration in the provision of a CCTV network is the ease with which camera locations may be moved. This is particularly important in the retail sector where display stands are regularly moved. This can present a problem with CCTV since the newly positioned displays can block areas of the store from CCTV coverage. The final aspect of the present invention solves this problem by providing an overhead track system, shown in Figure 8, for adjustably positioning at least one CCTV camera, the track system comprising :

a rail 110 having at least two tracks 112a,b supplying power for the cameras;

video transmitting means; and

at least one mount 114, insertably mountable in said rail and connectable to a camera and having electrical connectors to convey power to the camera.

Figure 8a shows a track system of the present invention, into which may be installed cameras - either fixed or with a PTZ head - and lighting. In fact, the concept of using track with indoor lighting schemes is well known: the light fittings are "clipped" into a standard lighting rail and rotated to illuminate the required area. By installing a series of tracks the store staff can easily and safely reposition lights. This

aspect of the present invention extends the concept to CCTV cameras. The major problem encountered is the increased complexity of the connections required: with track lighting schemes there are two non-polarised power connections, whereas with CCTV provision must be made for the video. Figure 8b shows a selection through a rail having two tracks 112a,b supplying power for the cameras. If the power input is AC (low voltage or mains) the mount 114 is reversible. If a DC power input is utilised the configuration shown in Figure 8c may be adopted, using two sets of two tracks 16a,b.

The video transmitting means may comprise, as shown in Figures 8b and d, a video track and two video return tracks (allowing reversal of the mount). Alternative means include the use of low power radio or infra red links, or to connect video into the rail using a local, non-contact "inductive loop" connection.

If multiple cameras are installed on a track, segregation is necessary. This may be achieved by switching the cameras one at a time onto the video track, or setting up separately wired zones 118a-d along the track, as depicted in Figure 8e. Control of the cameras may be achieved by utilising separate telemetry or, preferably, telemetry transmitted along the same track as the video.

CLAIMS

1. A CCTV system comprising a plurality of control network nodes in which the occurrence of events is broadcast over the network and each node responds thereto in a predetermined manner.

2. A CCTV system according to claim 1 in which the nodes include one or more telemetry receivers, matrix switches VCRs, multiplexers, alarm input or output modules, keyboards or video transmitters.

3. A CCTV system according to claim 1 or claim 2 in which the nodes are reprogrammable.

4. A CCTV system according to claim 3 in which the characteristics data for peripherals is downloadable.

5. A CCTV system according to any previous claim which further comprises a modem.

6. A CCTV system according to any one of claims 1 to 5 which further comprises a video transmission system.

7. A CCTV system according to claim 6 in which video transmission is via analogue or digital telephone connections, radio, a packet switched data network, a dedicated data network or a leased line.

8. A CCTV system according to any previous claims linked by RS485 or RS422 connectors, Free Topology wiring, fibre optic data, microwave, line of sight optical or radio links, or combinations thereof.

9. A CCTV system according to any one of claims 2 to 8 which supports several telemetry protocols.

10. A CCTV system according to any one of claims 2 to 9 in which telemetry data is sent to or received from receivers over the same coaxial cable that transmits the returning video signal.

11. A CCTV system according to any previous claim in which the control network is the "Echelon" system.

12. A CCTV system according to any one of claims 2 to 11 in which the matrix switches are cascaded.

13. A CCTV system according to any previous claim capable of redundant event handling.

14. A CCTV system according to claim 13 having a centralised computing hub.

15. A CCTV system according to any previous claim having an audio switching system.

16. A system according to any previous claim having a PC system configuration tool.

17. A method of reprogramming nodes comprising the steps of :

providing a node with a microprocessor having a volatile and a non-volatile memory area;

partitioning the non-volatile memory area into two segments;

programming one segment of the non-volatile memory with standard executable code;

transmitting reprogramming code to the volatile memory;

validating the reprogrammed code;

copying the reprogrammed code into the outer segment of the non-volatile memory; and

resetting the microprocessor to run the reprogrammed code.

18. A method according to claim 17 in which, in the event of an error or a special command, the reprogramming code in the other segment of the non-volatile memory is cleared and the standard executable code used.

19. A method according to claim 18 in which the validation is performed using standard checksums, parity bits and error correcting codes.

20. A method according to any one of claims 17 to 19 in which the non-volatile memory area is a FLASH ROM, EEPROM or a battery backed RAM, and the volatile memory area is a RAM.

21. A telemetry receiver for a CCTV system having bi-directional data transfer.

22. A telemetry receiver according to claim 21 which is remotely programmable for gain and lift.

23. A telemetry receiver according to claim 21 or claim 22 which transmits some or all of the pan, tilt and zoom settings.

24. A telemetry receiver according to claim 23 in which the pan, tilt and zoom settings are utilised to obscure a desired feature in the field of view of a camera.

25. A telemetry receiver according to claim 23 or claim 24 enabling remote control of the apparent pan and tilt speeds.

26. A telemetry receiver according to any one of claims 21 to 25 which downloads the characteristics of a desired PTZ head.

27. An operator's keyboard for a surveillance system having a card reader facility to identify the operator and the operator's level of access to the system.

28. An operator's keyboard according to claim 27 having PIN number access.

29. An operator's keyboard according to claim 26 or claim 27 in which the card is programmed to identify the operator's training status.

30. An operator's keyboard according to any one of claims 27 to 29 in which the card is programmed to identify an operator's priority level.

31. A CCTV system for low light level applications comprising a CCTV camera and a frame store in which the camera accumulates light for an extended exposure time during periods of low light level, the extended exposure time being greater than the period of one field, and the frame store repeats the previous frame during the extended exposure time, characterised in that the frame store is situated in the monitoring end of the system.

32. A CCTV system according to claim 31 in which the frame store is contained within a matrix switch.

33. A CCTV system according to claim 31 or claim 32 in which the camera automatically switches between ordinary operation and low light level operation.

34. A CCTV system according to one of claims 31 to 33 in which the camera transmits fields with blanked video throughout the field during the extended exposure time.

35. A CCTV system according to claim 34 in which the presence of a blanked video field is identified by the use of coding.

36. A CCTV system according to claim 35 in which the coding is Teletext compatible.

37. An overhead track system for adjustably positioning at least one CCTV camera, the track system comprising :

a rail having at least two tracks supplying power for the at least one camera;

video transmitting means; and

at least one mount, insertably mountable in said rail, connectable to a camera and having electrical connectors to convey power to the camera.

38. A track system according to claim 37 in which the camera is fixed or mounted on a PTZ head.

39. A track system according to claim 38 in which the video transmitting means comprises a video track and at least one video return track.

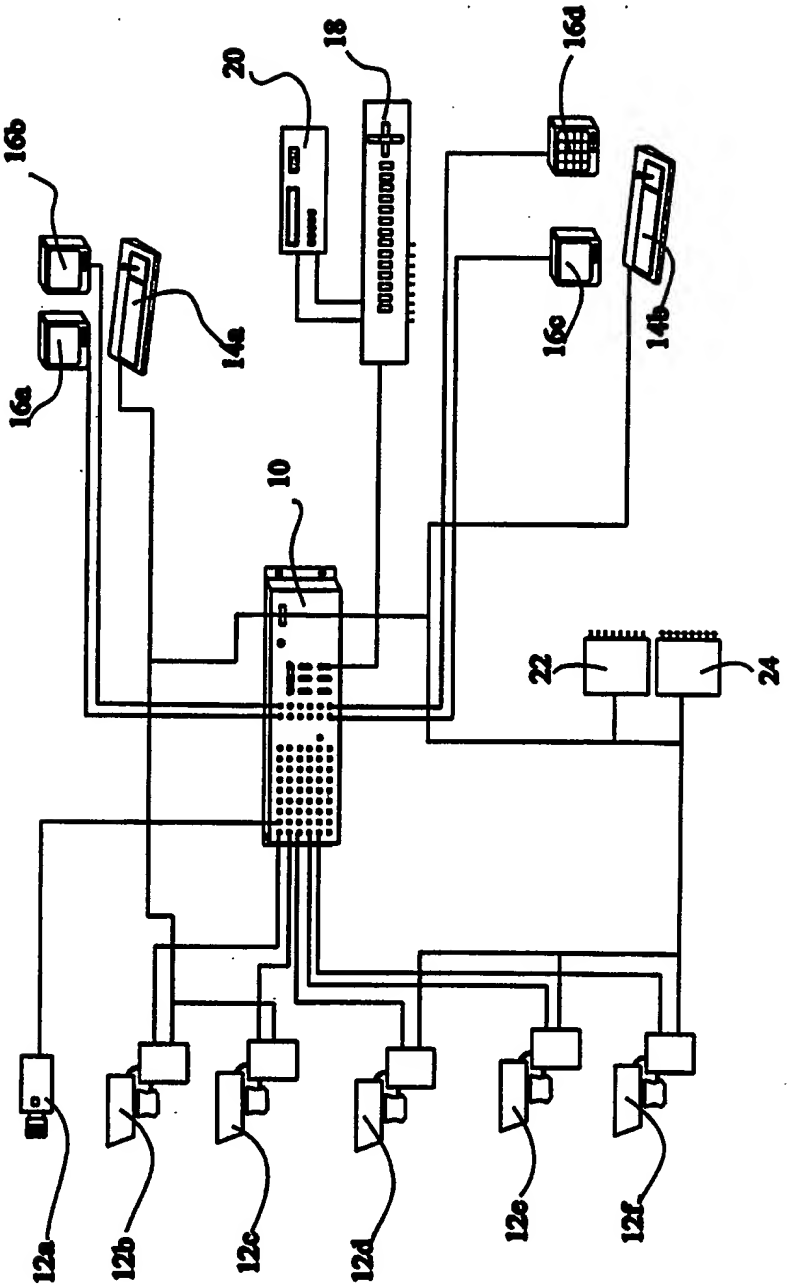
40. A track system according to claim 39 for reversible positioning of the mount comprising two video return tracks and two AC power tracks.

41. A track system according to claim 39 for reversible positioning of the mount comprising two video return tracks and four DC power tracks.

42. A track system according to any one of claims 39 to 41 in which the rail comprises separately wired zones into which only one camera may be positioned.

43. A track system according to claim 37 or claim 38 in which the video transmitting means comprises low power radio or infra red links.

44. A track system according to claim 37 or claim 38 in which the index transmitting means comprises an inductive loop connection.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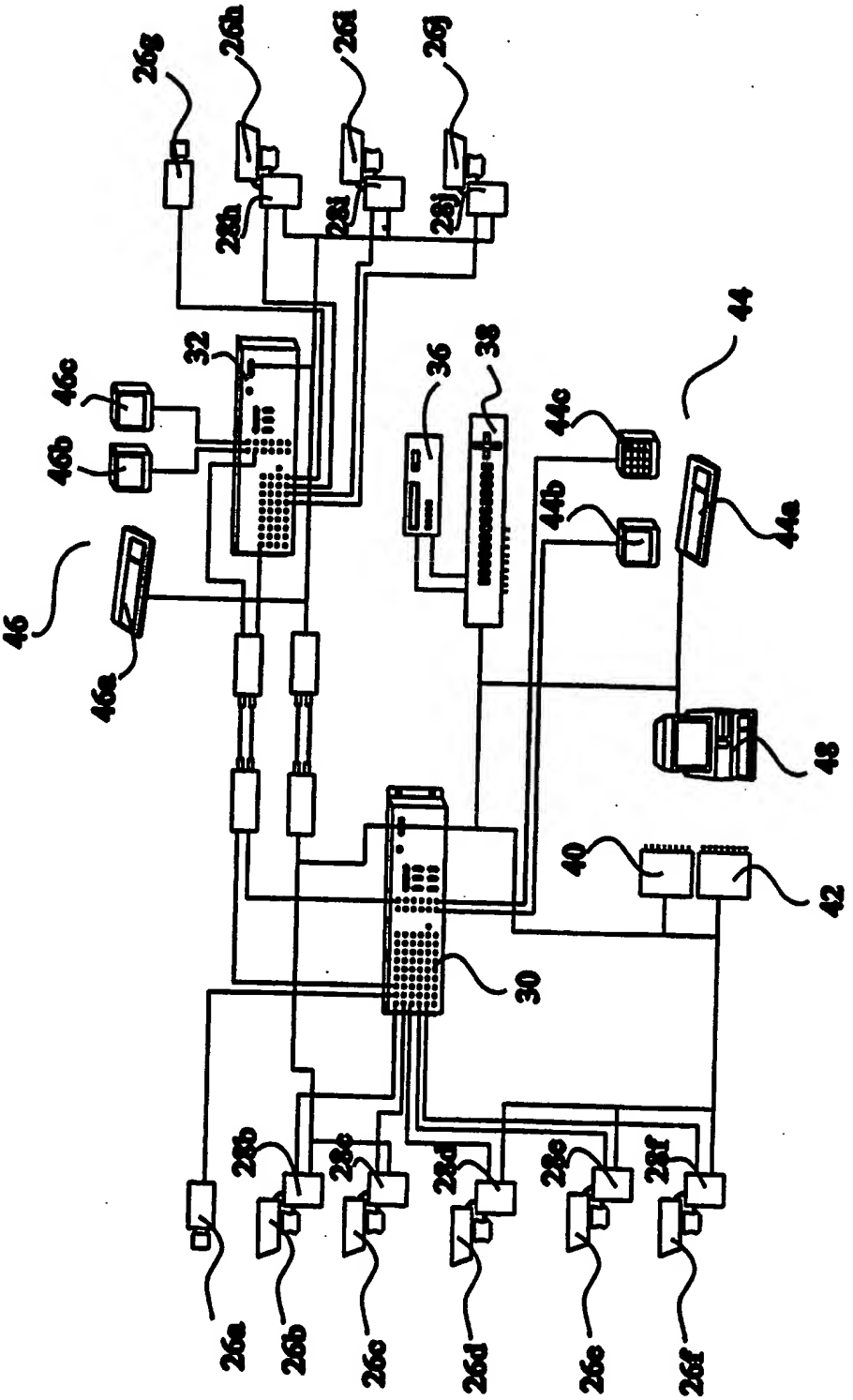
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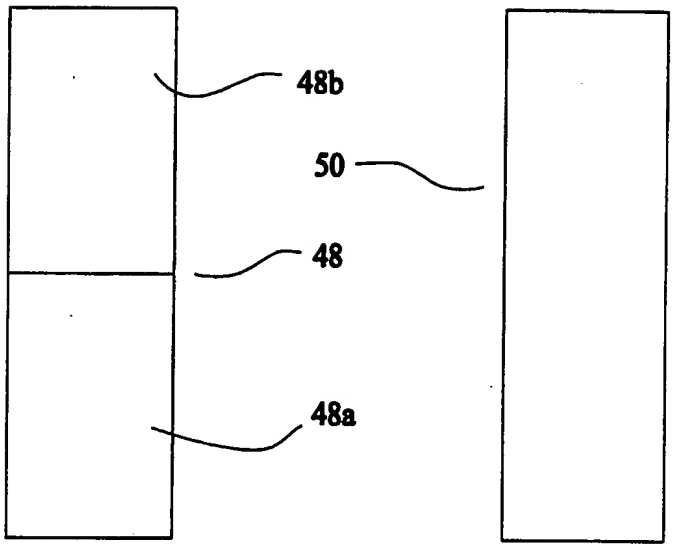
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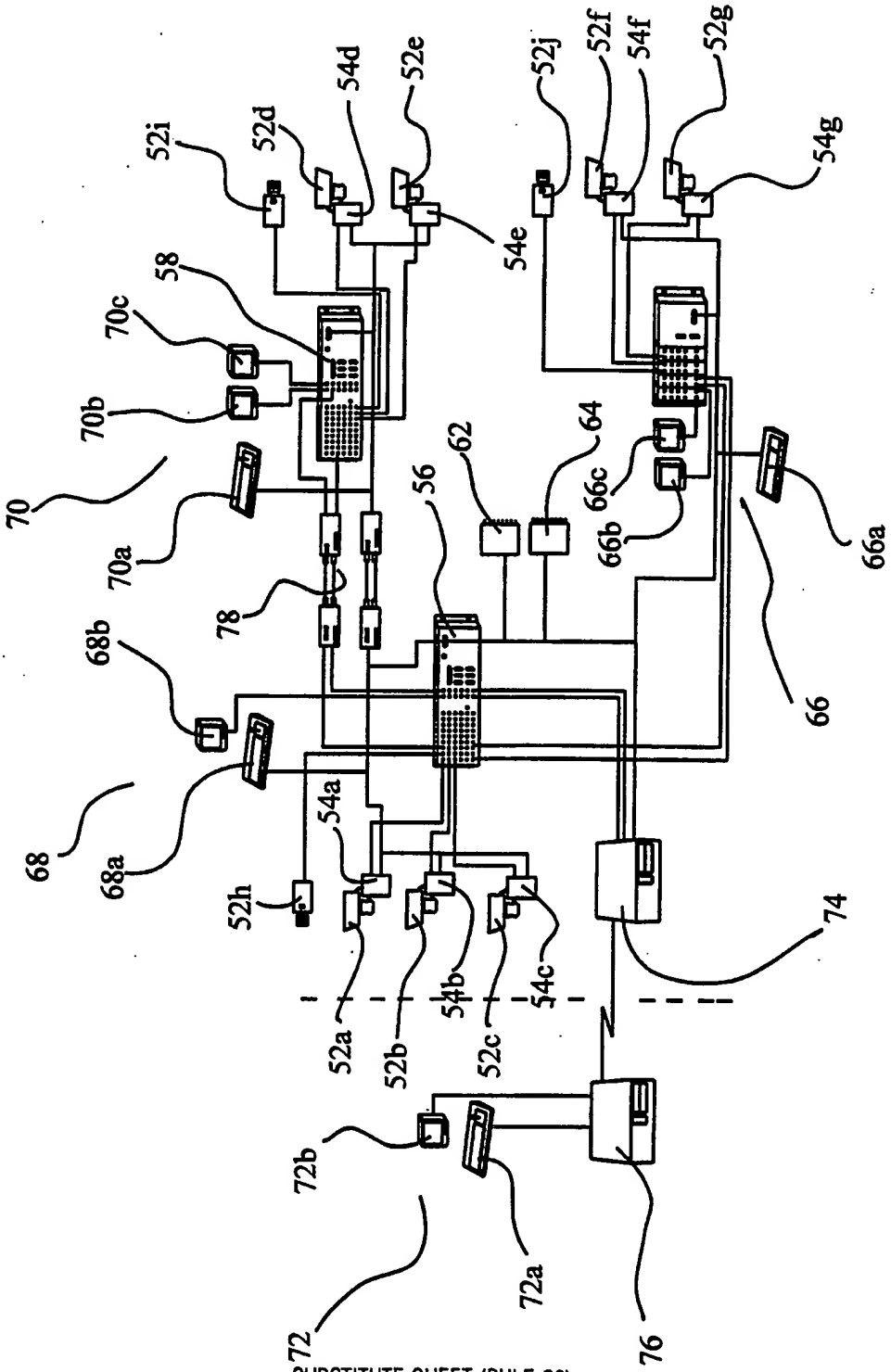
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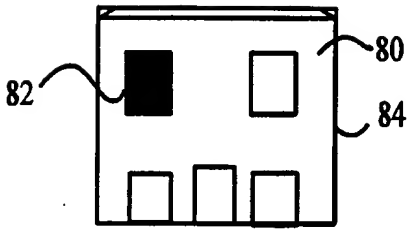

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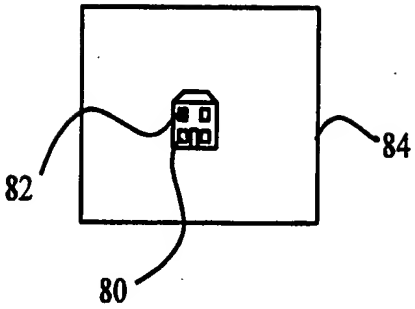

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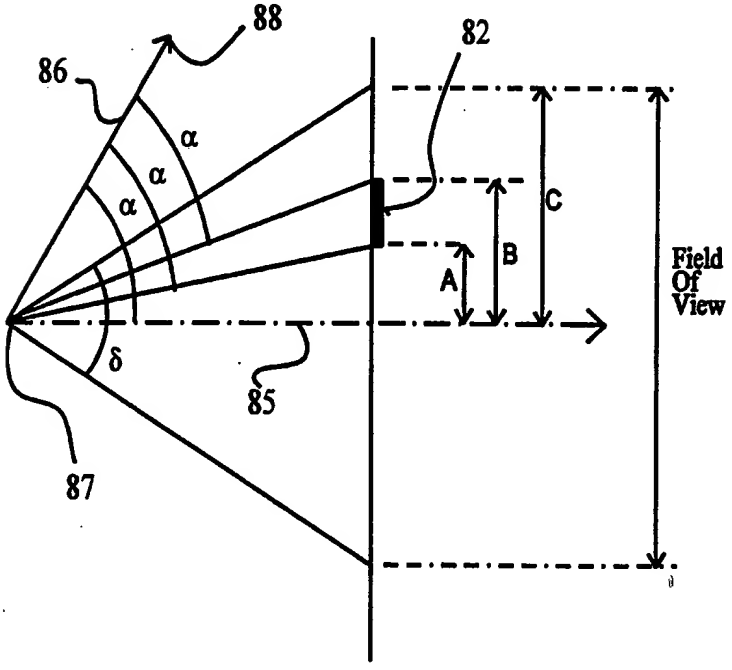

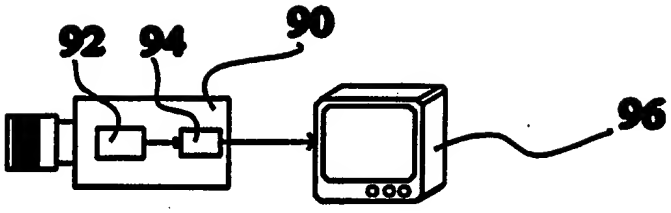
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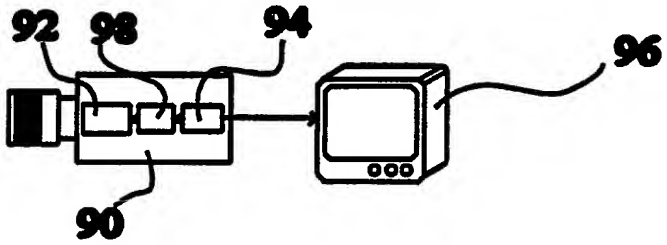
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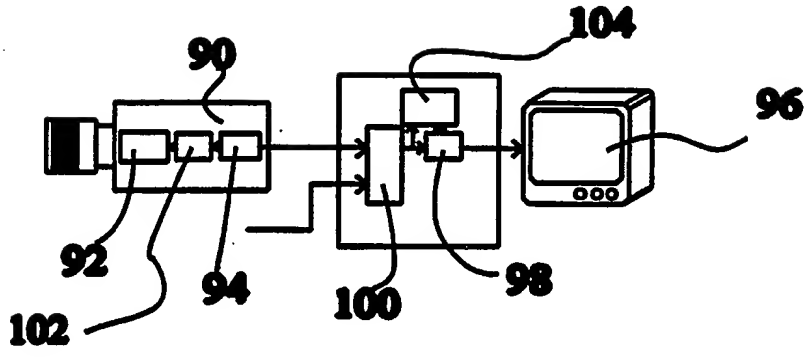
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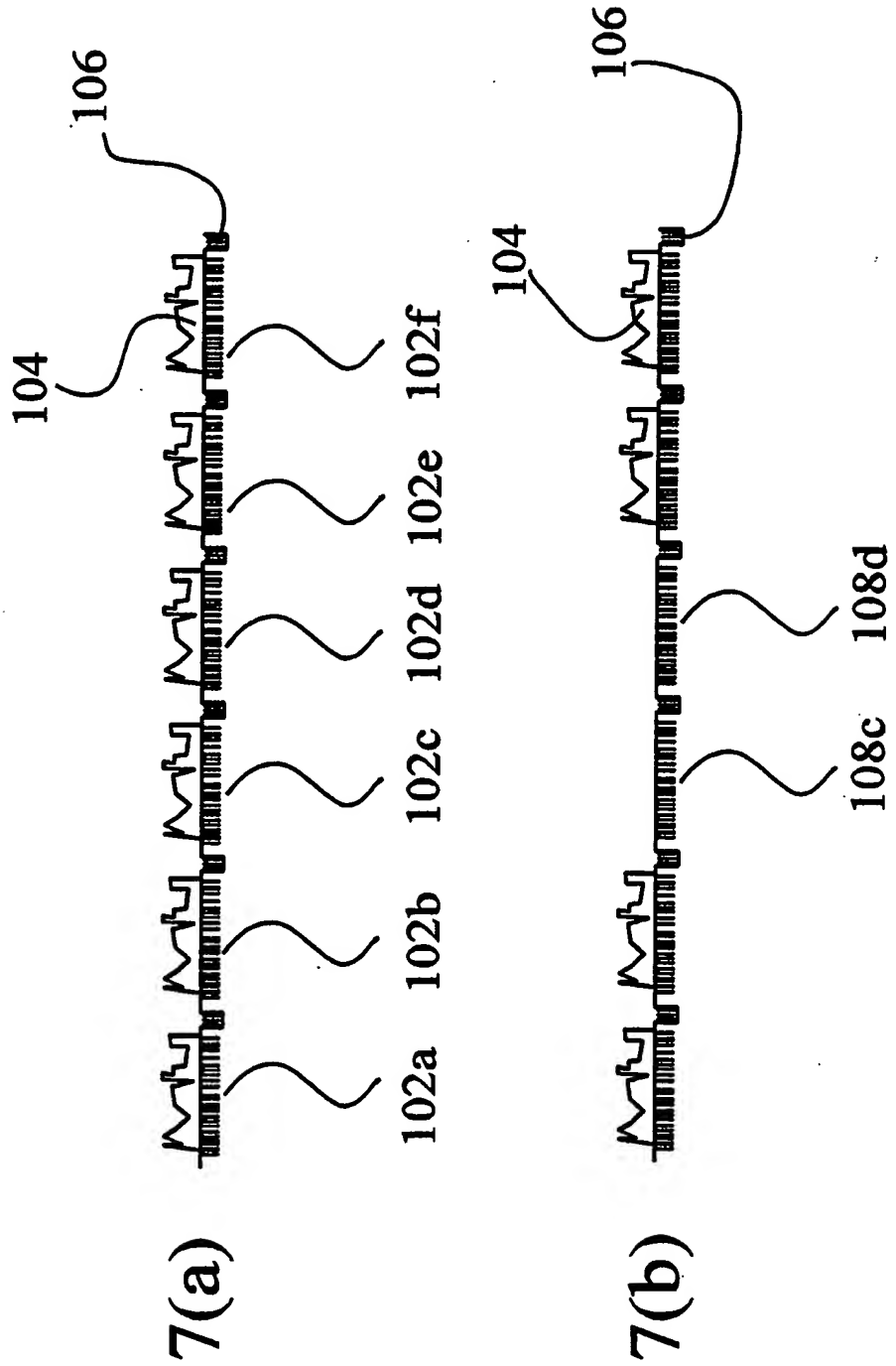
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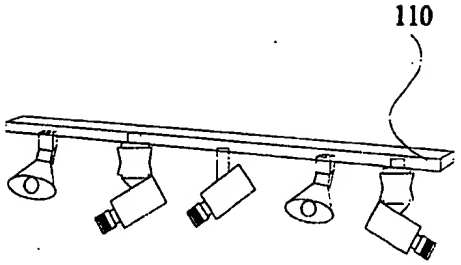
7(b)

8(a)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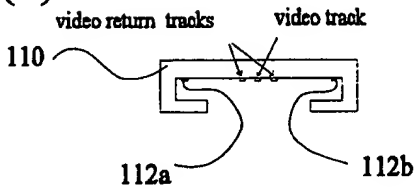
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video track
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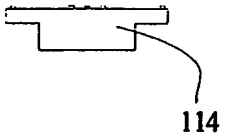
112b

8(c)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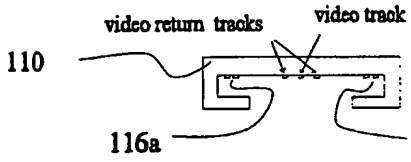
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video track
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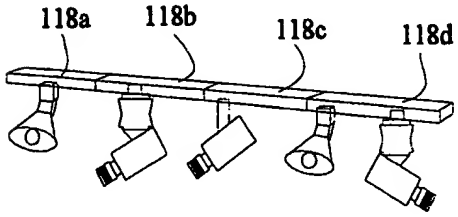
116b

8(d)

8(e)


118a
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INTERNATIONAL SEARCH REPORT

Ir. ational Application No
PCT/GB 96/01099

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N7/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US,A,5 237 408 (BLUM JEFFREY D ET AL) 17 August 1993 see the whole document	1,17,21 2-16, 18-20, 22-26
Y A	EP,A,0 371 150 (OLIVER ROBERT) 6 June 1990 see column 1, line 48 - column 5, line 25	1,17,21 2-16, 18-20, 22-26
Y A	EP,A,0 493 262 (SONY CORP) 1 July 1992 see column 7, line 40 - column 15, line 1	1,17,21 2-16, 18-20, 22-26

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 July 1996	12.08.96
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer Greve, M

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 96/01099

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	RADIO FERNSEHEN ELEKTRONIK, vol. 41, no. 8, 1 August 1992, pages 546-552, XP000306673 STEHLE R M: "KOMPONENTEN FUER OBJEKTSCHUTZ UND SICHERHEITSTECHNIK"	27-30
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Y	US,A,4 699 484 (HOWELL MARY E ET AL) 13 October 1987	37
A	see the whole document	38-44
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PCT/GB 96/01099

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